U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

03-OSR-0044

Mr. R. F. Naventi, Project Manager
Bechtel National, Inc.
2435 Stevens Center
Richland, Washington 99352

Dear Mr. Naventi:

CONTRACT NO. DE-AC27-01RV14136 – APPROVAL OF BECHTEL NATIONAL, INC. (BNI) AUTHORIZATION BASIS CHANGE NOTICE (ABCN) 24590-WTP-ABCN-ESH-02-019, REVISION 0

References:

1. BNI letter from A. R. Veirup to M. K. Barrett, ORP, "Transmittal for Approval – Authorization Basis Change Notice 2450-WTP-ABCN-ESH-02-019, Revision 0, Deletion of Requirement to Use Target Frequency and Revision to SC 2.0-1 and SC 4.1-3," CCN 036710, dated August 15, 2002.

2. ORP letter from R. J. Schepens to R. F. Naventi, BNI, "Approval of Bechtel National, Inc. (BNI) Authorization Basis Change Notices (ABCN) 24590-WTP-ABCN-ESH-01-001, Revision 1, 24590-WTP-ABCN-ESH-01-029, Revision 1, and Partial Approval of 24590-WTP-ABCN-ESH-02-019, Revision 0," 02-OSR-0449, dated October 3, 2002.

This letter conditionally approves the subject ABCN in its entirety. The U.S. Department of Energy, Office of River Protection (ORP) previously reviewed this ABCN and approved a portion of it in Reference 2. Two of the proposed changes submitted were not reviewed pending receipt of additional supporting information. In several meetings and communications between ORP and BNI staff, additional supporting information has been provided and determined acceptable.

In Reference 1, BNI proposed to revise Safety Requirements Document (SRD) Safety Criterion (SC) 4.1-3 and SC 4.1-4 such that a systems, structures and components with a natural phenomena hazards (NPH) safety function resulting only from protection of facility workers be excluded from the requirement to be classified as Seismic Category-I for earthquakes and Performance Category-3 for other NPH. In follow-up communications, BNI proposed to limit the applicability of this change to situations where the unmitigated dose calculation is less than 100 rem and also proposed to combine SC 4.3-3 and 4.3-4, thus eliminating SC 4.3-4.

Based on the information in Reference 1, in subsequent communications with BNI staff, and in the attached Safety Evaluation Report (SER), the changes are conditionally acceptable as noted; there is reasonable assurance that the health and safety of the public, the workers, and the environment will not be adversely affected by the changes, and they comply with applicable laws, regulations, and River Protection Project Waste Treatment and Immobilization Plant contractual requirements.

The conditions described in the attached SER are required revisions to the ABCN text originally proposed by BNI in Reference 1. Once these revisions have been incorporated into the SRD, as part of the amendment implementation process, please submit within 14 days of receipt of this letter the revised pages of the SRD identifying all revisions to date. This amendment is effective immediately and shall be fully implemented within 30 days. Controlled copies of the SRD and subordinate documents must be modified to reflect the changes associated with this amendment.

If you have any questions, please contact me, or your staff may call Walter J. Pasciak, WTP Safety Regulation Division, (509) 373-9189.

Sincerely,

Roy J. Schepens
Manager

OSR:WJP

Attachment

**Safety Evaluation Report (SER)
of Proposed Authorization Basis Change Notice (ABCN)
24590-WTP-ABCN-ESH-02-019, Revision 0 (Partial)
to the Safety Requirements Document (SRD)
for the River Protection Project Waste Treatment and Immobilization Plant (WTP)**

1.0 INTRODUCTION

The WTP authorization basis is the composite of information provided by the Contractor in response to radiological, nuclear, and process safety requirements that is the basis on which the U.S. Department of Energy (DOE), Office of River Protection (ORP) grants permission to perform regulated activities. The authorization basis includes that information requested by the Contractor for inclusion in the authorization basis and subsequently accepted by the ORP. The authorization basis for the WTP includes the SRD and the Integrated Safety Management Plan (ISMP). The SRD contains the approved set of radiological, nuclear and process safety standards and requirements which, if implemented, provide adequate protection of workers, the public, and the environment against the hazards associated with the operation of the facility. The ISMP contains the safety management practices developed specifically for the project in the areas of design, construction, commissioning, and operation. By letter dated August 15, 2002,[1] Bechtel National, Inc., (the Contractor) submitted a proposed amendment that affected the SRD. That amendment was partially approved in an earlier SER. This SER documents the ORP evaluation of the remaining changes proposed in ABCN 24590-WTP-ABCN-ESH-02-019, Revision 0.

2.0 BACKGROUND

The SRD contains the set of radiological, nuclear, and process safety standards necessary to ensure adequate protection of the health and safety of workers, co-located workers, the public, and the environment from radiological, nuclear, and process hazards. The SRD standards are developed by an iterative process. Included in the development process is a continuing review of industry practices, particularly those referenced in the SRD, and review of the results of the process hazards and accident analyses as they evolve with the design of the facility for potential impacts on the SRD standards used to ensure protection of the public and workers.

In ABCN 24590-WTP-ABCN-ESH-02-019, Revision 0, the Contractor proposed deleting the requirement to use target frequencies for selection and confirmation of control strategies from the SRD Appendices A and B. These changes were approved in a previous SER.[2] Also, the Contractor proposed a revision to SRD Safety Criteria 4.1-3 and 4.1-4 such that any structures,

[1] BNI letter from A. R. Veirup to M. K. Barrett, ORP, "Transmittal for Approval – Authorization Basis Change Notice 24590-WTP-ABCN-ESH-02-019, Revision 0, Deletion of Requirement to Use Target Frequency and Revision to SC 2.0-1 and SC 4.1-3," CCN 036710, dated August 15, 2002.

[2] ORP letter from R. Schepens to R. Naventi, BNI, "Approval of Bechtel National , Inc. (BNI) Authorization Basis Change Notices (ABCN) 24590-WTP-ABCN-ESH-01-001, Revision 1, 24590-WTP-ABCN-ESH-01-029, Revision 1, and Partial Approval of ABCN 24590-WTP-ABCN-ESH-02-019, Revision 0," 02-OSR-0449, dated October 3, 2002.

systems, and components (SSCs) with a natural phenomenon hazard (NPH) safety function resulting only from the protection of facility workers is excluded from the requirement to be classified as Safety Criterion-1 for earthquakes and Performance Category-3 for other NPH. This SER evaluates these remaining proposed changes.

3.0 PARTIAL EVALUATION - ABCN 24590-WTP-ABCN-ESH-02-019, REVISION 0

3.1 Proposed Change to SRD Safety Criterion 4.1-3

New text was added to have Safety Design Class (SDC) and Safety Design Significant (SDS) SSCs, whose safety function is solely for the protection of facility workers from exceeding chemical or radiological exposure standards, be designated as Seismic Category-III for earthquakes and Performance Category-2 for NPH events. In summary, the proposed change provides that if an SSC is designated SDC based solely on exceeding chemical exposure standards, or based solely on preventing facility workers from exceeding unmitigated facility worker exposures as a result of the NPH event less than 100 rem TEDE, the SSC shall be designated Seismic Category-III/Performance Category-2 and designed to the corresponding NPH loadings provided in Table 4-2, or if an SSC is designated SDS because the failure adversely affects the NPH safety function of an SDC SSC, and if the SDC SSC is designated SDC based solely on exceeding chemical exposure standards, or based solely on preventing facility workers from exceeding unmitigated facility worker exposures as a result of the NPH event less than 100 rem TEDE, the SDS SSC shall be designated Seismic Category-III/Performance Category-2 and designed to the corresponding NPH loadings provided in Table 4-2. Prior to this change, the SDC SSC was required to be designated Seismic Category-I/Performance Category-3 and designed to the corresponding NPH loadings provided in Table 4-1, and the SDS SSC was required to be designated Seismic Category-II /Performance Category-3 and designed to the corresponding NPH loadings provided in Table 4-1. Subsequently, in a discussion with the Contractor,[3] it was requested that Safety Criterion 4.1-3 be modified as follows and that Safety Criterion 4.1-4 be deleted:

Safety Criterion 4.1 – 3

SSCs designated as ITS shall be designed to withstand the effects of NPH events such as earthquakes, wind, and floods without loss of capability to perform specified safety functions. This includes both the primary and support systems that must function for an NPH event such that the public, co-located worker, or facility worker exposure standards of Safety Criteria 2.0-1 or 2.0-2 are not exceeded. The design shall consider both direct and indirect NPH effects, including common cause effects and interactions from failures of other SSCs. NPH design requirements for the various subcategories of ITS SSCs as described below.

The equivalence of the WTP Seismic Category to the seismic Performance Category of DOE-STD-1020-94 is as follows:

[3] Request from L. Dougherty, BNI, to W. Pasciak, ORP, on November 19, 2002.

- Seismic Category-I is equivalent to Performance Category-3, except that the inelastic energy absorption factor shall be assumed to be 1.0.

- Seismic Category-II is equivalent to Performance Category-3, Seismic Category-III is equivalent to Performance Category-2, and Seismic Category-IV is equivalent to Performance Category-1.

1. For SDC SSCs that have an NPH safety function, the NPH design shall be as follows:

   a. If the SSC has a seismic NPH safety function, the SSC shall be designated Seismic Category-I and designed to the seismic loadings provided in Table 4-1.[4]

   b. If the SSC has a non-seismic NPH safety function, the SSC shall be designated Performance Category-3 and designed to the corresponding non-seismic NPH loadings provided in Table 4-1.

2. For SDS SSCs whose failure under NPH conditions could adversely affect the NPH safety functions of an SDC SSC, the NPH design shall be as follows:

   a. If the SSC failure from a seismic event could adversely affect the seismic NPH safety functions of an SDC SSC, the SSC shall be designated Seismic Category-II and designed to the seismic loadings provided in Table 4-1[5]. (Note: for Seismic Category-II SSCs under this category, credit may be taken for inelastic energy absorption for seismic response.)

   b. If the SSC failure from a non-seismic NPH event could adversely affect the non-seismic NPH safety functions of an SDC SSC, the SSC shall be designated Performance Category-3 and designed to the corresponding non-seismic NPH loadings provided in Table 4-1.

3. SDC SSCs that do not have an NPH safety function, SDS SSCs that do not adversely affect the NPH function of an SDC SSC, and RRC SSCs that provide primary confinement of significant inventories of radioactive materials but in amounts less than quantities that require an SDC or SDS designation shall be:

   a. designed to the corresponding NPH loadings provided in Table 4-2
   b. designated Seismic Category-III
   c. designated non-seismic NPH Performance Category Performance Category-2

[4] There are two exceptions to this requirement: (1) An SSC designated SDC based solely on its function to prevent exceedance of chemical exposure standards of SRD Safety Criterion 2.0-1, or (2) An SSC designated SDC based solely on its function of preventing facility workers from exceeding radiological exposure standards of SRD Safety Criterion 2.0-1. For the second exception to apply, unmitigated facility worker exposures as a result of the NPH event can not exceed 100 rem TEDE. SSCs meeting either of these exceptions shall be designated Seismic Category-III /Performance Category-2 and designed to the corresponding NPH loadings provided in Table 4.2.

[5] SDS SSCs that could adversely affect the NPH safety function of SDC SSCs meeting footnote 4, shall have the same designation and shall be designed to the same NPH loadings as are required by the footnote 4 for the SDC SSCs.

4. RRC SSCs that do not provide primary confinement of significant inventories of radioactive materials shall be:

   a. designed to the corresponding NPH loadings provided in Table 4-2
   b. designated Seismic Category-IV
   c. designated Non- Seismic NPH Performance Category-1

Implementing Codes and Standards

ACI 318-99, *Building Code Requirements for Structural Concrete*

ACI 318R-99, *Commentary on Building Code Requirements for Structural Concrete*

ACI 349-01, *Code Requirements for Nuclear Safety-Related Concrete Structures*

ACI 349R-01, *Commentary on Code Requirements for Nuclear Safety-Related Concrete Structures*

ACI 530-99, *Building Code Requirements for Masonry Structures and Commentary*

AISC MO16-89, *Manual for Steel Construction - Allowable Stress Design, Ninth Edition*

ANSI/AISC N690-94, *Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities*

ASCE 4-98, *Seismic Analysis of Safety-Related Nuclear Structures and Commentary*

ASCE 7-98, *Minimum Design Loads for Buildings and Other Structures*

DOE-STD 1020-94 (Change 1, 1996), *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*

IEEE 344-1987 (R1993), *Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*

1997, *UBC Uniform Building Code*

DOE Newsletter (Interim Advisory on Straight Winds and Tornados) Dated 1/22/98

24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document Volume II*

Appendix A, “Implementing Standard for Safety Standards and Requirements Identification”

Regulatory Basis

DOE/RL-96-0006, *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor,* Section 4.2.2.2, "Proven Engineering"

Practices/Margins-Common-Mode/Common-Cause Failure

Table 4-1 Natural Phenomena Design Loads Applicable to the NPH Safety Functions of SSCs that are Designated SDC/SC-I, SDC/PC-3, SDS/SC-II, and SDS/PC-3

Hazard	Load	Source Document for Load
Seismic	DBE with 0.26 *g* horizontal PGA and 0.18 *g* vertical PGA See Figures 4-1 and 4-2	WHC-SD-W236A-TI-002 [a] DOE-STD-1020-94 [b]
Straight wind	111 mi/hr , 3-second gust, at 33 ft above ground, Importance factor, I=1.0	DOE Newsletter [c]
Wind Missile	2x4 timber plank, 15 lb at 50 mi/hr (horiz), Max height 30 ft	DOE-STD-1020-94 [b]
Tornado and Tornado Missiles	Not Applicable	DOE-STD-1020-94 [b]
Volcanic ash	12.5 lb/ft ^{2}	HNF-SD-GN-ER-501 [d]
Flooding	Dry site for river flooding Local precipitation: 4 in. for 6 hours	HNF-SD-GN-ER-501 [d]
Snow	15.0 lb/ft ^{2} snow load	HNF-SD-GN-ER-501 [d]

[a] Geomatrix, 1996, *Probabilistic Seismic Hazard Analysis DOE Hanford Site, Washington,* WHC-SD-W236A-TI-002, Rev.1A, prepared for Westinghouse Hanford Company, Richland, Washington.

[b] DOE STD-1020-94, (1996, Change 1) *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*, U.S. Department of Energy, Washington, D.C., 1996.

[c] DOE Newsletter (Interim Advisory on Straight Winds and Tornados) Dated 1/22/98.

[d] HNF-SD-GN-ER-501, Rev. 1, "Natural Phenomena Hazards, Hanford Site, South-Central Washington," Westinghouse Hanford Company.

Table 4-2. Natural Phenomena Design Loads Applicable to the NPH Design of ITS SSCs Where Table 4-1 Does Not Apply

Hazard	Load	Source Document for Load
Seismic	DOE-STD-1020-94 (Capacity from Uniform Building Code [a], Static Force Procedure)	DOE-STD-1020-94 [b]
Straight wind	91 mi/hr 3-second gust, at 33 ft above ground, Importance factor, I=1.00	DOE Newsletter [c]
Wind Missile	Not Applicable	DOE-STD-1020-94 [b]
Tornado and Tornado Missiles	Not Applicable	DOE-STD-1020-94 [b]
Volcanic ash	5 lb/ft ^{2}	HNF-SD-GN-ER-501 [d]
Flooding	Dry site for river flooding Local Precipitation: 2.5 in. for 6 hours	HNF-SD-GN-ER-501 [d]
Snow	15.0 lb/ft ^{2} snow load	HNF-SD-GN-ER-501 [d]

[a] 1997, *Uniform Building Code*, International Conference of Building Officials, Whittier, California.

[b] DOE STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*, U.S. Department of Energy, Washington, D.C., Change 1, 1996.

[c] DOE Newsletter (Interim Advisory on Straight Winds and Tornados) Dated 1/22/98

[d] HNF-SD-GN-ER-501, Rev. 1, "Natural Phenomena Hazards, Hanford Site, South-Central Washington," Westinghouse Hanford Company

Figure 4-1

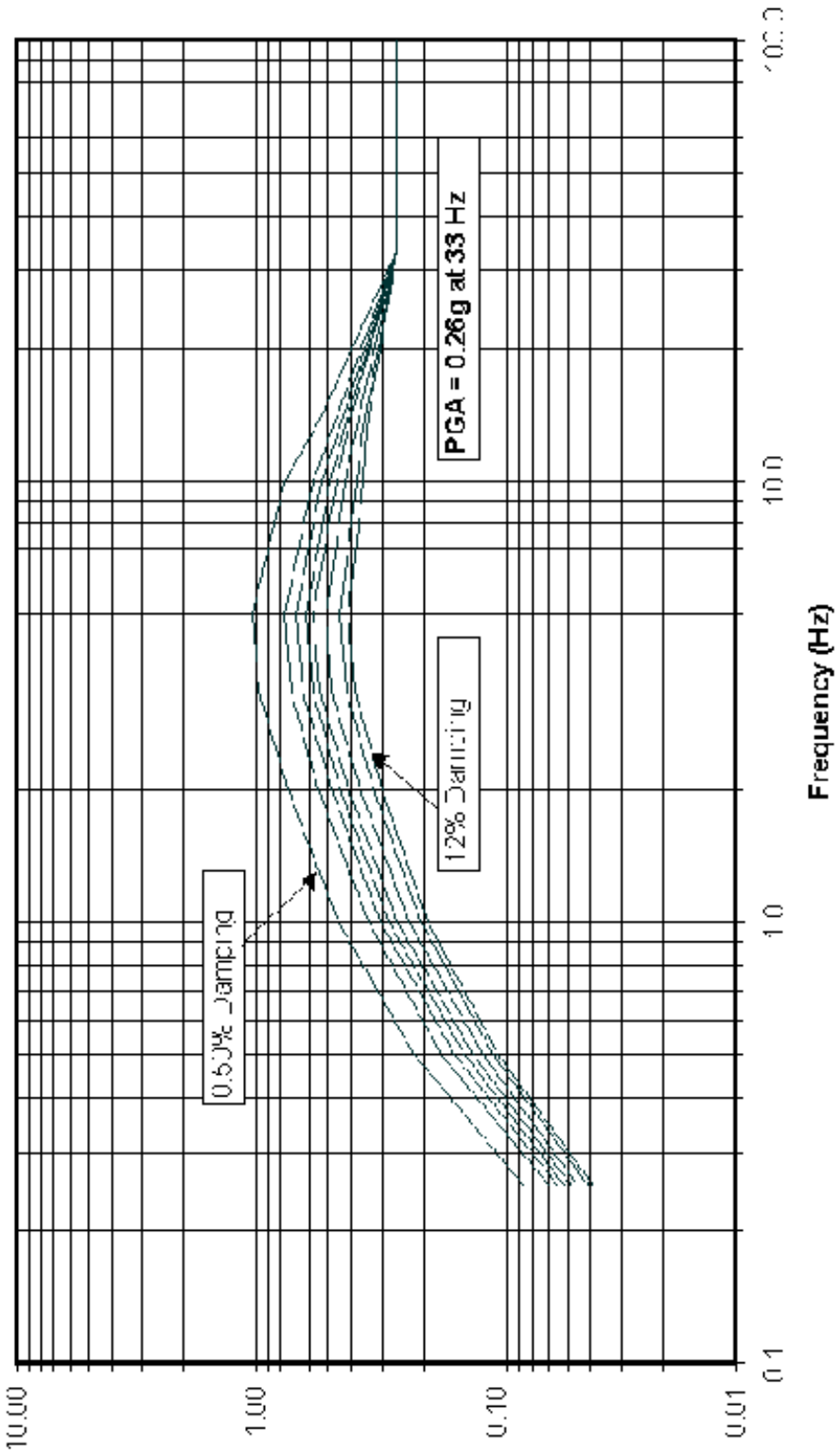
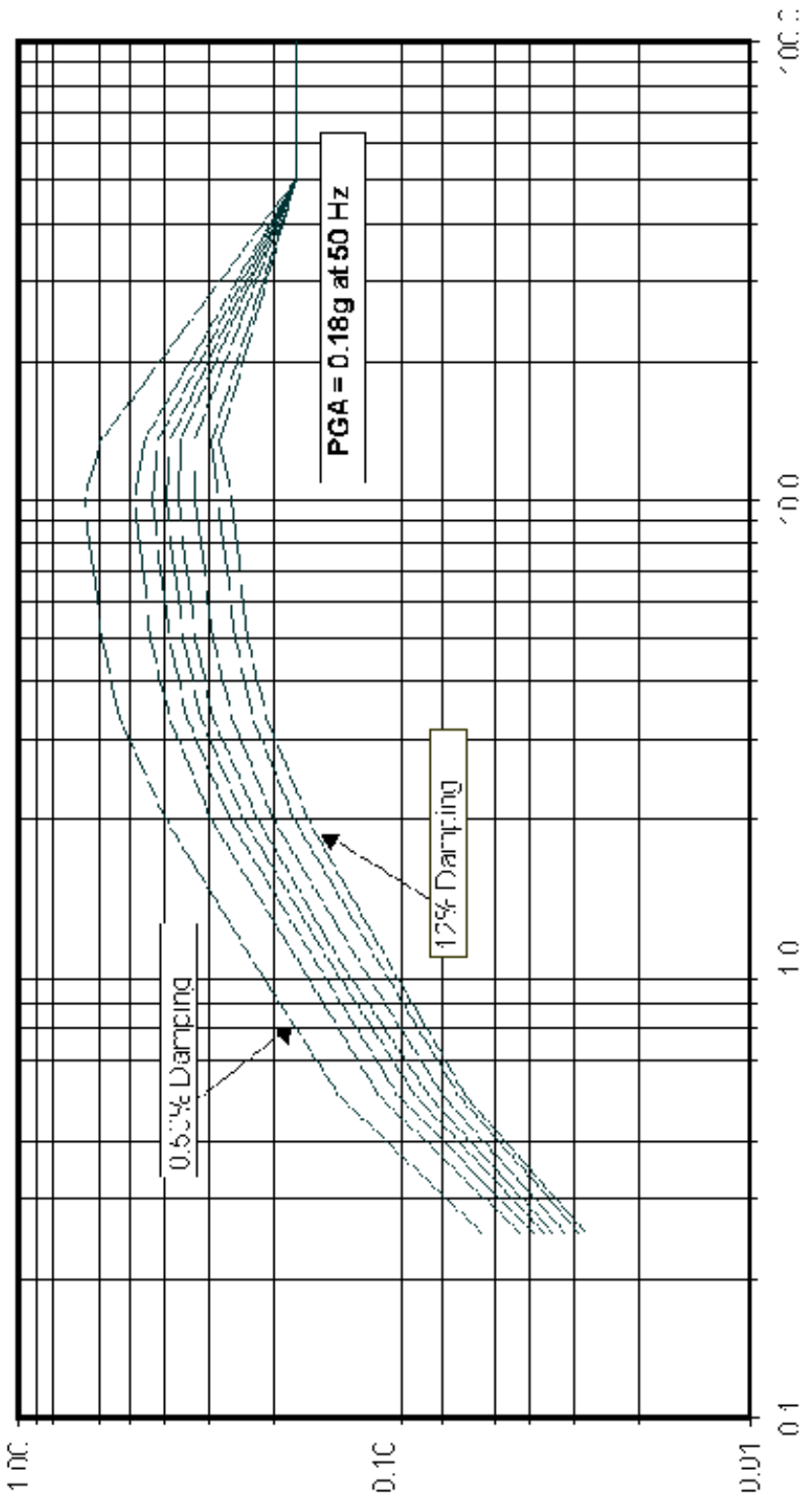

RPP-WTP DBE Horizontal Response Spectra
(0.50%, 2%, 3%, 4%, 5%, 7%, 10%, 12% Damping)
PGA = 0.26g at 33 Hz
0.50% Damping
12% Damping
10.00
1.00
0.10
0.01
0.1
1.0
10.0
Frequency (Hz)

Figure 4-2

RPP-WTP DBE Vertical Response Spectra
(0.50%, 2%, 3%, 4%, 5%, 7%, 10%, 12% Damping)



Evaluation (conditionally approved): The proposed changes associated with this SRD Safety Criterion are conditionally approved as described in Safety Criterion 4.1.3, above. In summary, the proposed changes are as follows:

If an SSC is designated SDC based solely on preventing facility workers from exceeding unmitigated facility worker radiological exposures as a result of the NPH event less than 100 rem TEDE, the SSC shall be designated Seismic Category-III/Performance Category-2 and designed to the corresponding NPH loadings provided in Table 4-2. Previously, the SSC was designated Seismic Category-I/Performance Category-3 and designed to the corresponding NPH loading provided in Table 4-1.

If an SSC is designated SDS because the failure adversely affects the NPH safety function of an SDC SSC, and if the SDC SSC is designated SDC based solely on preventing facility workers from exceeding unmitigated facility worker radiological exposures as a result of the NPH event less than 100 rem TEDE, the SDS SSC shall be designated Seismic Category-III/Performance Category-2 and designed to the corresponding NPH loading provided in Table 4-2. Previously for worker radiological exposure, the SSC was designated Seismic Category-II/Performance Category-3 and designed to the corresponding NPH loading provided in Table 4-1.

Current DOE guidance (DOE-STD-3009, DOE STD-1021-93) recognizes that the limits on the radiation exposure of facility workers in the accident analysis should be greater than the stricter limits provided to the public. This distinction is made, in part, because of the extensive training received by the facility workers for the operation of the facility, including accident response activities, compared to downwind individuals (i.e., co-located workers and members of the public). DOE-STD-1021-93, July 1993 (Change Notice No. 1, January 19, 1996, Section 2.4 (d) Performance Category 2) provides lower NPH (seismic) design requirements for the safety of facility workers (i.e., as Performance Category 2/Seismic Category-III instead of the previous designation of Performance Category 3/Seismic Category I). Further, the 100 rem dose limitation for facility workers is also consistent with the final U.S. Nuclear Regulatory Commission (NRC) recommendations in 10 CFR Part 70.61 (b).[6] Specifically, the NRC regulation defines an acute dose of 100 rem as a performance requirement for protecting facility workers from high consequence internally or externally (NPH) initiated events analyzed in the required integrated safety analysis. Based on this information, the proposed change for facility workers is found acceptable and is consistent with existing relevant laws and regulations. Other changes to the Safety Criterion relate to formatting and are administratively approved as they do not affect the intent of the Safety Criterion.

3.2 Proposed Changes to SRD Safety Criterion C 4.1-4[7]

This criterion provides NPH design requirements for SSCs that are important-to-safety and whose NPH design requirements are not provided under the existing Table 4-1 of Safety Criterion C 4.1-3. As noted in Item 3.1 above, the Contractor has proposed to delete this SC and combine its criteria with those of revised Safety Criterion C 4.1-3.

[6] FR, Vol. 65, No. 181, Monday, September 18, 2000, pp. 56211-56231, *Domestic Licensing of Special Nuclear Material; Possession of a Critical Mass of Special Nuclear Material.*
[7] Ibid 2.

Evaluation (acceptable): The deletion of this Safety Criterion is acceptable because its criteria have been combined with Safety Criterion 4.1-3.

4.0 CONCLUSION

On the basis of the considerations described above, the ORP has concluded there is reasonable assurance that the health and safety of the public, the workers, and the environment will not be adversely affected by the proposed changes. The proposed changes to the SRD do not constitute a reduction in commitment or effectiveness. Accordingly, the proposed changes are conditionally acceptable and the ORP approves the amendments as proposed in ABCN-24590-02-019 (partial approval), Rev. 0.